

Study provides evidence against the fetal origins of cancer and cardiovascular disease

March 27 2015



A 3D ultrasound taken of a fetus. Image: Wikimedia.

A study by researchers at Columbia University's Mailman School of Public Health and colleagues in the Netherlands evaluated the relationship between nutritional conditions in very early life and adult health, and found that famine exposure during the first pregnancy trimester was associated with increases in mortality from a variety of causes other than cancer or cardiovascular disease.

This is the first study to quantify the possible long-term effects of nutrition deprivation at different stages of pregnancy and long-term mortality from causes of death coded by the current International

Statistical Classification of Diseases.

Findings are published in the *American Journal of Epidemiology*.

The study evaluated how famine exposure—defined as 900 calories or less per day—during the Dutch Hunger Winter of 1944-1945 at different stages of pregnancy affected mortality through age 63.

Of more than 41,000 men born in the Netherlands from January 1944 to December 1947 and examined at age 18 years for military service in the Netherlands, 22,952 were born at the time of the Dutch Famine in six famine-stricken cities. A total of 5,011 deaths recorded during the follow-up period included 1,938 deaths (39 percent) from cancer, 1,040 (21 percent) from heart disease, and 1,418 (29 percent) from other natural causes, including diseases of the circulatory system (excluding [heart disease](#)) and diabetes. In addition, there were 523 deaths (10 percent) from external causes, such as transportation accidents, and intentional self-harm. The researchers adjusted for father's occupation, religion, education, body mass index, and fitness for military service.

"The circumstances of the Dutch Hunger Winter of 1944-1945, with civilian starvation caused by the conditions of World War II, offer a unique opportunity to study the possible fetal origins of common diseases and adult health and critical periods in gestation," said L.H. Lumey, MD, PhD, Mailman School associate professor of Epidemiology and lead author. Prior studies by the Mailman School of Public Health and other institutions have reported an increase in [body mass index](#) and a prevalence of type 2 diabetes in both men and women after prenatal famine exposure, but until now results have been inconsistent with respect to [cardiovascular disease](#).

"The robustness of the patterns we observed in the different control groups points to very early gestation as the period when the fetus is

especially sensitive to the environment. It also suggests that early childhood exposure to the famine for people born just before the famine had no impact on long-term mortality in this population," according to Lumey.

Continuing Research

Further follow-up of the participants will provide more accurate risk estimates of mortality from specific causes of death after nutritional disturbances during gestation and very early life.

"These are the first study results of a very long-term project. The men in our study population were 63 years of age at follow-up and 85 percent of the cohort is still alive. They will now be entering a period of rapidly increasing mortality," said Lumey, "and this will provide significantly more study power in the future to detect small but important associations between famine exposure by stage of gestation and even more narrowly defined causes of death."

With a recent renewal of funding from the National Institutes of Health, the study will soon be expanded to include socio-economic outcomes (employment, wages, and disability benefits) for analysis with state-of-the-art epidemiologic and econometric methods. "Our new analyses will integrate currently separate research traditions from medical and social sciences and are likely to lead to a better understanding of 'fetal programming' and its implications," said Lumey.

The expanded study will include as co-investigator Nobel Laureate James Heckman from the University of Chicago to look at long-term effects of early deprivation on human capital outcomes.

Provided by Columbia University's Mailman School of Public Health

Citation: Study provides evidence against the fetal origins of cancer and cardiovascular disease (2015, March 27) retrieved 19 May 2023 from <https://medicalxpress.com/news/2015-03-evidence-fetal-cancer-cardiovascular-disease.html>

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